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FOREST PEST MANAGEMENT
Pacific Southwest Region

Report No. 83-04

3430 Evaluation
January 11, 1983

AN EVALUATION OF THE JACKASS INSECT SALVAGE SALE AREA, TRUCKEE RANGER DISTRICT, TAHOE NATIONAL FOREST

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Richard Smith, Pathologist

ABSTRACT

Evaluation of Jeffrey pine mortality in the Jackass Insect Salvage Sale area identified the Jeffrey pine beetle, Dendroctonus jeffreyi, and overstocking as the primary problems. The potential for Jeffrey pine beetles emerging from trees on National Forest land in the spring-summer of 1983 and attacking trees on adjacent private property is discussed. Both short- and long-term management alternatives are presented.

INTRODUCTION

The Jackass Insect Salvage Sale area was examined on the morning of December 9, 1982 by Forest Pest Management (FPM) entomologist John Wenz and pathologist Richard Smith. They were accompanied by District Resources Officer John Kennedy, Small Sales Officer Jerry Kent and, for part of the evaluation, by Ms. Stefanie Erber, owner of the land adjacent to and north of the sale area.

The purpose of this examination was to evaluate the Jeffrey pine beetle (JPB) and other pest conditions in the salvage sale area and provide management alternatives designed to help reduce pest impacts to tolerable levels. Of particular concern was the potential of JPB breeding in and emerging from trees on National Forest land in the spring-summer of 1983 and attacking trees on the adjacent private land.

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OBSERVATIONS/DIAGNOSIS

The stands examined were predominantly 90-110 year old Jeffrey pine with lesser amounts of white fir and lodgepole pine. The site is a Dunning III. Stocking densities were typically in excess of 400 sq.ft./acre which is higher than is generally considered desirable for maintaining good tree vigor. No dwarf mistletoe was observed in the parts of the stand examined. Detection of root disease was not possible due to snow conditions, but some of the openings indicated that the root disease, Fomes annosus, may be present in the stand. Several Jeffrey pine mortality groups were observed throughout the area. The immediate cause of this mortality was the Jeffrey pine beetle, Dendroctonus jeffreyi (Coleoptera: Scolytidae). The mortality groups included: (1) green trees currently infested with JPB (1982-83 generation), (2) trees that died last year (1981-82 generation), and (3) trees that died prior to last year. Typically, the currently infested trees were within 15 to 25 yards of trees killed in 1981 by JPB, providing circumstantial evidence that, for the last couple of years, emerging adult beetles have tended to attack nearby trees. In addition, a few lodgepole pine were observed to have been killed by the mountain pine beetle, D. ponderosae.

In summary, the Jeffrey pine beetle and overstocking are the primary factors contributing to the Jeffrey pine mortality in the area examined.

Jeffrey Pine Beetle Biology. The Jeffrey pine beetle attacks and reproduces only in Jeffrey pine. There is one generation per year, with adults flying and attacking living trees from late-May to mid-October in the Truckee area; peak flight probably occurs from mid-June thru August. Successfully attacked trees usually do not fade until the spring or summer following attack. The Jeffrey pine beetle normally attacks scattered, individual trees that have been predisposed (weakened) by such factors as reduced vigor associated with overmaturity, root disease, dwarf mistletoe, lightning, drought and/or overstocking. Such weakened trees are generally more likely to be successfully attacked. The JPB has an aggregating pheromone that attracts other JPB to the area of a tree under attack. Once a large number of beetles have been attracted to an area, they may be able to attack and overcome apparently healthy trees, causing the typical group kill.

PROGNOSIS

The population dynamics of JPB are not understood to the extent that the amount of mortality (due to JPB) in a given location in a given year can be predicted with much accuracy and reliability. Unknown and/or difficult to measure factors include: 1) the amount and significance of under-bark brood mortality due to parasites, predators and other causes, 2) the number of beetles that will emerge during the summer, 3) the "quality" or "vigor" of the emerging beetles, 4) how far and in what direction(s) emerging beetles will fly, 5) how much in-flight mortality will occur, and 6) the "vigor" or susceptablity of potential hosts. However, given "normal" weather conditions and the generally high level

of JPB activity over the last 1-2 years in the Truckee area combined with the overstocked stand conditions, it seems reasonable, and perhaps prudent, to assume that mortality will continue at about the same level in 1983.

Also, given the observed tendency for trees near existing mortality groups to be attacked, there may be an increased (but unknown) probability that some trees within 100 feet or so of currently infested trees will be attacked in 1983. This means that there is some likelihood that beetles in currently infested trees on National Forest land within 100 feet of the property boundary could emerge in the summer of 1983 and attack trees on the adjacent private property and vice versa. However, it should be pointed out that it would be extremely difficult to identify where the beetles that killed any given tree actually came from. While the 100 foot "zone" is based on observations made in this particular situation, it is nonetheless arbitrary. While it may be that trees within 100 feet of groups of currently infested trees have an increased chance of being attacked by the next generation of beetles (how much greater is open to question), bark beetles can fly at least 8 to 9 miles and it is certainly possible that trees may be attacked by JPB flying in from well outside the immediate sale area.

MANAGEMENT ALTERNATIVES/DISCUSSION

It seems appropriate to discuss management alternatives within the context of two considerations, 1) what can reasonably be done to minimize JPB-related mortality in 1983, and 2) what can be done to mitigate factors or conditions that predispose trees to successful bark beetle attack; that is, what can be done to promote vigorous, healthy stands, thus creating conditions conducive to reducing/preventing beetle-and other-pest related mortality over the long-term.

With respect to the first consideration, the assumption can be made that destruction or removal from the area of JPB brood in currently infested trees has a reasonable chance of reducing mortality to nearby (within 100 feet) Jeffrey pine in 1983. By inference, this would reduce the chances of beetles emerging from trees on National Forest land and attacking trees on the adjacent private land. This assumption may or may not be true. Another way to state the problem is that because of the high values of the resources (trees) involved, making this assumption, and acting accordingly, may be preferable to taking no action and thus having no chance of reducing the potential for additional mortality in 1983.

The following alternatives are available to destroy/remove JPB brood in currently infested trees. All involve identifying, marking and felling currently infested trees. Time of implemention would depend on the treatment, but in all cases would be prior to beetle emergence, which, depending on weather conditions (which influence beetle brood development), could begin by mid-May and, most likely, by mid-June.

1. Removal of infested trees from the area. The idea is to remove the currently infested trees from the area so that if and when the adults emerge they are not a threat to trees in the treatment area. This can be accomplished through a salvage sale that is conducted within the time constraints noted above. This would necessitate transporting the infested trees to an area well removed from any stands of Jeffrey pine to eliminate the chances of beetles emerging (if the trees are not milled, processed or utilized early enough) and attacking Jeffrey pine in the area.

2. Peeling the bark. Jeffrey pine beetle brood feed and develop between the bark and the wood. Peeling off the bark exposes the brood to desiccation and predation. If done in a timely manner, this technique should be completely effective in killing the brood. However, at this time of year the bark tends to be difficult to peel and implementation would be labor intensive.

3. Burning infested trees. Burning infested trees to the degree that the bark is almost entirely consumed (not just scorched) should also be effective. Problems involve transporting the trees to a suitable burn location, getting burn temperatures high enough to consume the bark (particularly when bark is thick) and disposal of post-burn residues.

4. Submergence in water. Storing infested logs in water (such as mill ponds) can probably be effective if submerged for six weeks or longer. The logs must be rolled to submerge the upper surface for an additional six weeks.

5. Insecticides. Little work has been conducted relative to the effects of insecticides on JPB. Perhaps the best potential insecticide option available to the Forest Service is Dursban 4E. The efficacy data for this material is based on studies with the southern pine beetle and a Special Local Need (SLN) registration from the California Department of Food and Agriculture would be needed as well as an approved Forest Service-Pesticide Use Request (FS-2100-2). Another insecticide, Sevimol-4, might be an option, but is currently only registered for preventive, not remedial, treatment and would also require an SLN. It is also considered to be less efficacious than Dursban 4E for remedial treatment.

The second consideration is the reduction or prevention of mortality over the long-term. Bark beetle problems in California have usually been associated with trees and stands that have been weakened or stressed by some predisposing agent or condition. Given sufficient numbers, bark beetles can successfully attack and kill healthy trees. However, it usually takes fewer beetles to kill stressed, weakened, less vigorous trees. Relatively few beetles may successfully attack a weakened tree and produce an aggregating pheromone. The pheromone may attract sufficient numbers of additional beetles to the area to overcome nearby healthy trees. As noted previously, predisposing factors include, injury by fire, mechanical injury from logging or road and

building construction; mechnical injury to trees near campsites and campground facilities; soil compaction; drought induced moisture stress; photochemical air pollution; salt damage; root disease; dwarf mistletoe; Elytroderma; overstocking and poor site conditions.

Thus, long-term mitigation of bark beetle-related mortality should include measures to prevent and/or reduce such predisposing factors. Important among approaches to prevent or reduce predisposing factors is vegetation management. This includes silvicultural options to control stocking levels, species composition and regeneration. Such practices are compatible with measures recommended to manage diseases like dwarf mistletoes. Conducting operations, such as logging, in a skilled and careful manner so as not to damage residual trees and create undue soil disturbance is another critical element in the overall preventive approach. Managing for healthy, vigorous stands should also reduce the impacts of non-manageable factors like drought.

In the Jackass Salvage Sale area, overstocking appears to be a contributing factor, and bark beetle-related losses, or at least the probability of sustaining bark beetle-related mortality, cannot be reduced in the long run without addressing this problem. Reducing stocking to levels more appropriate to the site and increasing species diversity in the stands (i.e., encouraging species other than Jeffrey pine like white fir, lodgepole pine, and hardwoods), should be of benefit in preventing/reducing JPB mortality. Regional Basal Area Guidelines indicate that reducing stocking levels to between 154 sq.ft./ac. and 218 sq.ft./ac. would be beneficial. In addition, all stumps should be treated with borax at the time of harvest to prevent new infections by annosus root disease.

In summary, it is possible that JPB in currently infested trees on National Forest land will emerge in the spring-summer of 1983 and attack trees on the adjacent private property (and vice versa). It is not possible to reliably quantify the probability that this will happen or, if mortality ultimately does occur on the adjacent private property in 1983, prove conclusively that it actually did happen. At the same time, it is also possible that the destruction and/or removal of JPB brood in currently infested trees, particularly those within 100 feet of the property boundary, would decrease (by some unknown degree) the probability of additional mortality occurring on the private land. Taking such action would not guarantee the absence of JPB-related mortality on the adjacent private property in 1983, but would, from an entomological viewpoint, constitute a reasonable attempt to mitigate the immediate situation. Long-term preventive action would include bringing the vegetation in the area under active management, particularly from the standpoint of regulating stocking density and species composition.

4th reissuance of the general mailing list for Sagehen Creek, Truckee Ranger District, Tahoe National Forest

MAILING LIST #3 (Developed Recreation Site I&D's) AND 3430 memo of 1-11-83 to: FS, Tahoe NF

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1-11-83

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7 National Forest Supervisors: All (except Tahoe N.F.*)
8 R-5 National Forest Ranger Districts: All (except Truckee RD, Tahoe NF* on attached list)

2 R-5 FPM people: D.R. Hart, B.T. Sturgess (w/copy of this list)
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3 Others: Roy Richards, CFPCAC Chairman
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